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COMMONWEALTH OF AUSTRALIA

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(Accompanied by a
Provisional Specification)

Complete Specification
entitled (54) DETENT OR LOCKING MECHANISM.

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Applicant (71) COMMONWEALTH OF AUSTRALIA.

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Related Art (56)	236,376(44,444/58)	89.3
	213,006(21,927/56)	89.3
	150,635(4261/51)	89.3.

The following statement is a full description of this invention, including the best method of performing it known
to us

8,776,166

This invention relates to a firearm of the type comprising a breech chamber, a breech block movable along a guide passage between a forward position in which it closes one end of the chamber and a cocked position, clear of the chamber, the block being biased towards the forward position but being retainable in the cocked position by a trigger sear, the block being moved away from the forward position after firing of the weapon under the impetus of gases generated in the chamber during firing. In particular, the invention relates to sub-machine guns of this type.

According to the invention there is provided in a weapon of the above type a locking member movable by manually operable means between an inoperative position in which it is clear of the passage and an operative position in which it projects into the passage, and a pair of abutment surfaces on the block one of which is arranged so that when the block is retained in the cocked position by the sear, movement of the locking member towards its operative position causes it to engage the one surface before such movement is complete, subsequent completion of that movement causing movement of the block rearwardly from the cocked position to establish a clearance between the block and sear, engagement of the one surface with the locking member when the latter is in its operative position preventing return of the block to the cocked position, and the other of which is arranged so that its engagement with the locking member when the latter is in its operative position prevents any substantial movement of the block away from its forward position.

By way of example, one embodiment of a sub-machine gun in accordance with the invention will now be described

416737

8,776/66

with reference to the accompanying drawings in which:-

Figure 1 is a sectioned elevation of part of the sub-machine gun showing the trigger, breech and safety mechanism where the weapon is cocked and the safety mechanism is inoperative.

Figures 2A and 2B are enlarged sectioned elevations of the safety mechanism only, Figure 2A showing the mechanism in its inoperative position

416737

8,776/66

and Figure 2B showing it in the operative position,

Figure 3 is a view similar to Figure 1 but showing the safety mechanism in its operative position, and

Figure 4 is a further sectioned elevation of part of the sub-machine gun which shows the weapon uncocked with the safety mechanism in its operative position.

The weapon illustrated in the drawings is of common general construction comprising a hollow wooden grip 11 fixed to a housing 12 which contains the trigger and safety mechanisms. Housing 12 is in turn firmly attached to a steel tube 13 which provides a guide for a breech bolt 14. The weapon is of the simple "blowback" type, and the breech bolt 14 is of generally cylindrical cross-section. Bolt 14 is provided with an integral protrusion 15, which functions as a firing pin, in a cartridge seating recess 16. An extractor lever 17 is pivoted in a slot 18 at the forward end of the bolt. Bolt 14 is also provided with a projection 19 which serves as the bent for the trigger mechanism, and tube 13 has an opening 20 through which one end of a pivoted sear 21 can project to engage bent 19. The other end of sear 21 is arranged co-operate in known manner with one of two projections 22, 23 on a pivoted trigger 24. Operation of the sear by projection 22 provides single-shot operation, while operation by projection 23 causes automatic fire. Sear 21 is urged by a spring 25 in an anti-clockwise direction as viewed in the Figures 1 to 3 towards a stop 26 in the housing 12.

As stated above, housing 12 also contains the safety mechanism. This mechanism comprises a lever 27 of special shape mounted approximately at its centre on a pivot pin 28 which extends between the side walls of housing 12. The rear portion 29 of lever 27 has

416737

8,776/66

a recess 30 in its underside to receive one end of a compression spring 31 the other end of which is received in a recess 32 in trigger 24. The forward portion 33 of lever 27 is provided with an upward, wedge-shaped projection 34 and tube 13 has an opening 35 through which projection 34 can move to engage a recess 36 in the slotted portion of bolt 14. The underside of portion 33 is shaped to co-operate with a rotatable cam 37 formed on the central portion of a shaft 38 which extends between the side walls of housing 12. The left hand end of shaft 38 (as viewed by the user of the weapon) is provided with a transverse lever (not shown which lever may be operated by the thumb of a right-handed firer of the weapon to rotate shaft 38 while his index finger remains on trigger 24. The free end of the lever may be provided with a spring-loaded projection to engage one of two recesses in the outer surface of housing 12 to hold the safety alternatively in the operative or inoperative position.

The geometry of cam 37 and portion 33 of lever 27 is shown most clearly in Figures 2A and 2B. Cam 37 is a solid semi-cylinder having a curved peripheral surface 39 and a flat surface 40 which, in profile, define respectively a semi-circle centred on the axis of rotation of the cam and a diameter of the circle. Lever 27 has two flat surfaces 41, 42 which meet at an angle to one another. Figure 2A shows the parts in positions corresponding to those in Figure 1 in which surface 40 on the cam lies at an angle approximately 45° to the vertical with its upper portion abutting flat surface 41 on lever 27. The forward end of lever 27 then lies below the axis of shaft 28 and, as shown in Figure 1, projection 34 lies within the housing 12 and the thickness of tube 13, so that bolt 14 is free to move in the boltway when sear 21 is disengaged from bent 19 by operation of trigger 24.

415737

8,776/66

When shaft 38 is pivoted anti-clockwise (as viewed in the Figures) by the lever described above, the upper edge 43 of cam 37 first moves along surface 41 thereby pivoting lever about its pivot 28 to raise the forward end of the lever. After edge 43 reaches the junction between surfaces 41, 42 the point of contact changes to surface 42 which then rests on the cylindrical surface 39 of the cam. The mechanism is then in the safety position shown in Figures 2B and Figure 3 and is held therein by the engagement of the projection on the rotator lever (not shown) with the appropriate detent as described above.

The formation of the underside of lever 27 with two cam follower surfaces 41, 42 permits maximum elevation of projection (i.e. roughly half the diameter of the shaft 38) for a small rotation of the shaft, i.e. approximately 45° , while allowing the location of contact of the cam with the lever to change to the second surface 42 after this small rotation of the shaft.

As shown in Figure 3, the pivoting of lever 27 as described above causes projection 34 to enter recess 36 in bolt 14 thereby restraining the bolt from movement in either direction in the boltway except to take up clearance between the projection and the recess. Projection 34 engages the rear surface of recess 36 just before lever 27 has completed its pivoting movement, so that when the pivoting movement is complete bolt 14 has been retracted a short distance to provide a small clearance 45 between the operating faces of sear 21 and bent 19. Pivoting of lever 27 also causes portion 29 of that lever to move to a position closely adjacent and above the forward end of sear 21, thereby preventing operation of trigger 24 while the safety is applied. However, were the portion 29 to be omitted, or accidentally broken off, during service, so that operation of trigger 24 was possible

416737

8,776/66

with the safety applied, clearance 45 would ensure that sear 21 could return to its normal position shown in Figure 3 after such operation of the trigger. If no such clearance were provided, friction between the co-operating faces of sear 21 and bent 19 might prevent full return of the sear and the weapon might be discharged upon release of the safety mechanism. The safety mechanism is released by clockwise rotation (as viewed in the Figures) of shaft 38 which causes anti-clockwise pivoting of lever 27 under the action of the spring 31.

Since lever 27 engages the cylindrical surface 39 of cam 37 when the safety mechanism is in the "safe" condition, any reaction on the cam by virtue of that engagement will be directed toward the axis of rotation of the cam. Hence no force on lever 27, such as could occur from an accidental blow or by an attempted operation of the trigger, can result in a turning movement of the cam.

As shown in Figure 4, steel tube 13 extends forwardly of the housing 12 and in fact extends for the full length of the weapon. A support ring 46 is mounted in this tube to receive the rear end of a gun barrel 47. Between support 46 and housing 12, tube 13 is provided on its underside with a spent-cartridge ejection opening 48 and on its upper side with an opening to receive a magazine holder 49. The rear end of breech bolt 14 has a blind bore 50 to receive one end of a strong compression spring 51 which is also supported by a guide 52 attached to the rear end (not shown) of the tube 13.

Figure 4 shows the weapon in an uncocked condition with the chamber 53 empty. Under conditions of use, the weapon may be carried in this condition with a full magazine and if no means were provided to prevent movement of bolt 14 and the weapon was

416737

8,776,166

dropped on its butt, the breech bolt 14 might be moved away from the breech against the action of spring 51 for a sufficient distance to feed a round from the magazine into the chamber 53, thereby discharging the weapon. In order to prevent this, shaft 38 may be rotated to the safety position as shown in Figure 4 so that projection 34 rises into the bolt way behind projection 19 and prevents undue movement of the bolt 14 away from the breech.

Although the weapon described in some detail above is of the simple "blowback" type, it will be appreciated that similar safety devices could easily be devised for application to weapons of other types, for instance machine guns firing "from open breach" in which the safety could be arranged to lock the breech block operating mechanism with the block either in the cocked position or closed on an empty chamber. Further, the invention in its broadest aspect is not limited to safety devices for weapons, but may be applied to any detent or locking means for reciprocable parts in many mechanical systems. It is therefore, to be understood that many modifications and adaptations may be made to the particular mechanism described above without departure from the spirit and scope of the invention as defined by the appended claims.

416737

8,776/66

The claims defining the invention are as follows:-

1. A firearm comprising a breech chamber, a breech block movable along a guide passage between a forward position in which it closes one end of the chamber and a cocked position, clear of the chamber, the block being biassed towards the forward position but being retainable in the cocked position by a trigger sear, the block being moved away from the forward position after firing of the weapon under the impetus of gases generated in the chamber during firing,

a locking member movable by manually operable means between an inoperative position in which it is clear of the passage and an operative position in which it projects into the passage, and

a pair of abutment surfaces on the block one of which is arranged so that when the block is retained in the cocked position by the sear, movement of the locking member towards its operative position causes it to engage the one surface before such movement is complete, subsequent completion of that movement causing movement of the block rearwardly from the cocked position to establish a clearance between the block and sear, engagement of the one surface with the locking member when the latter is in its operative position preventing return of the block to the cocked position, and the other of which is arranged so that its engagement with the locking member when the latter is in its operative position prevents any substantial movement of the block away from its forward position.

416737

8,776/66

2. A firearm as claimed in claim 1 wherein a further surface is provided on the block arranged to limit the degree of clearance provided between the block and the sear when the locking member is located in its operative position.

3. A firearm as claimed in claim 1 or claim 2 wherein the locking member is biased towards the inoperative position.

4. A firearm as claimed in any one of claims 1 to 3 wherein said manually operable means comprises a movable cam and said locking member comprises a cam follower engaging said cam.

5. A firearm as claimed in claim 4 wherein said cam is rotatable about an axis and the cam profile includes a part-circular portion centred on said axis, which portion is engaged by said locking member when it is in its operative position.

6. A firearm as claimed in claim 5 wherein the cam profile includes a flat portion, which engages a portion of the locking member when the latter is in its inoperative position, whereby rotation of the cam towards the locking member causes the member to move off the flat portion of the cam and onto the part-circular portion thereof.

7. A firearm as claimed in claim 6 wherein the locking member is provided with two flat portions set at an angle to one another, such that one of them is the portion which is engaged by the cam when the member is in its inoperative

416737

, 8,776/66

position, and when the cam is rotated towards the member the points of contact on the member and the cam change at substantially the same time to the other flat portion on the member and the part-circular portion of the cam.

8. A firearm according to any one of claims 1 to 7 wherein the locking member is provided with means which, when the member is in its operative position, is so located relative to the trigger sear of the weapon as to prevent movement thereof sufficient to clear the path of movement of a bent provided on the breech block.
9. A firearm substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 20th day of August, 1971.

COMMONWEALTH OF AUSTRALIA

by its Patent Attorneys,
DAVIES & COLLISON.

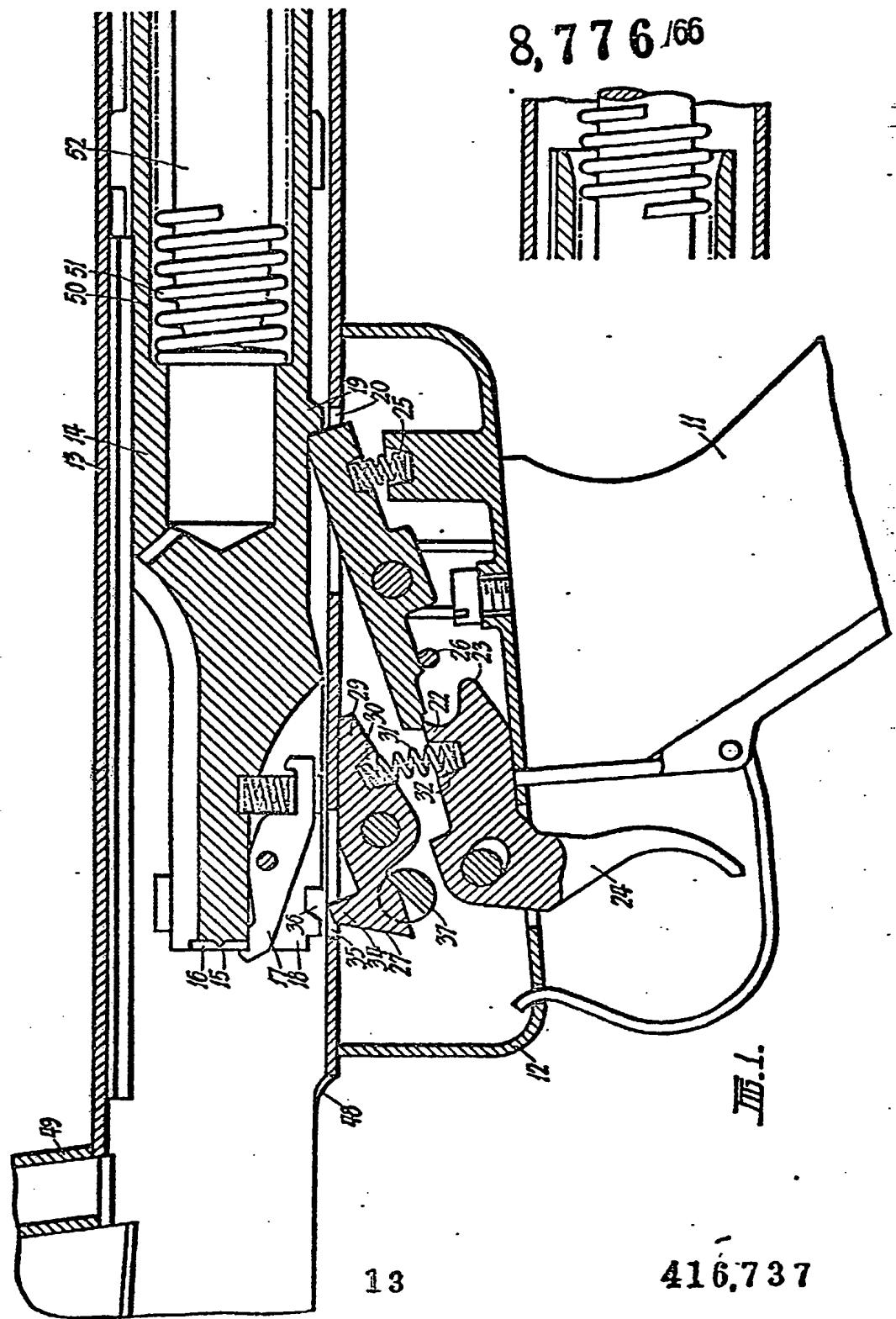
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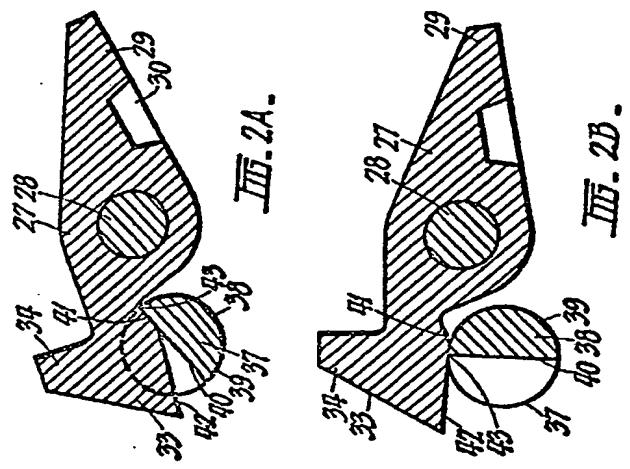
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8,776/66



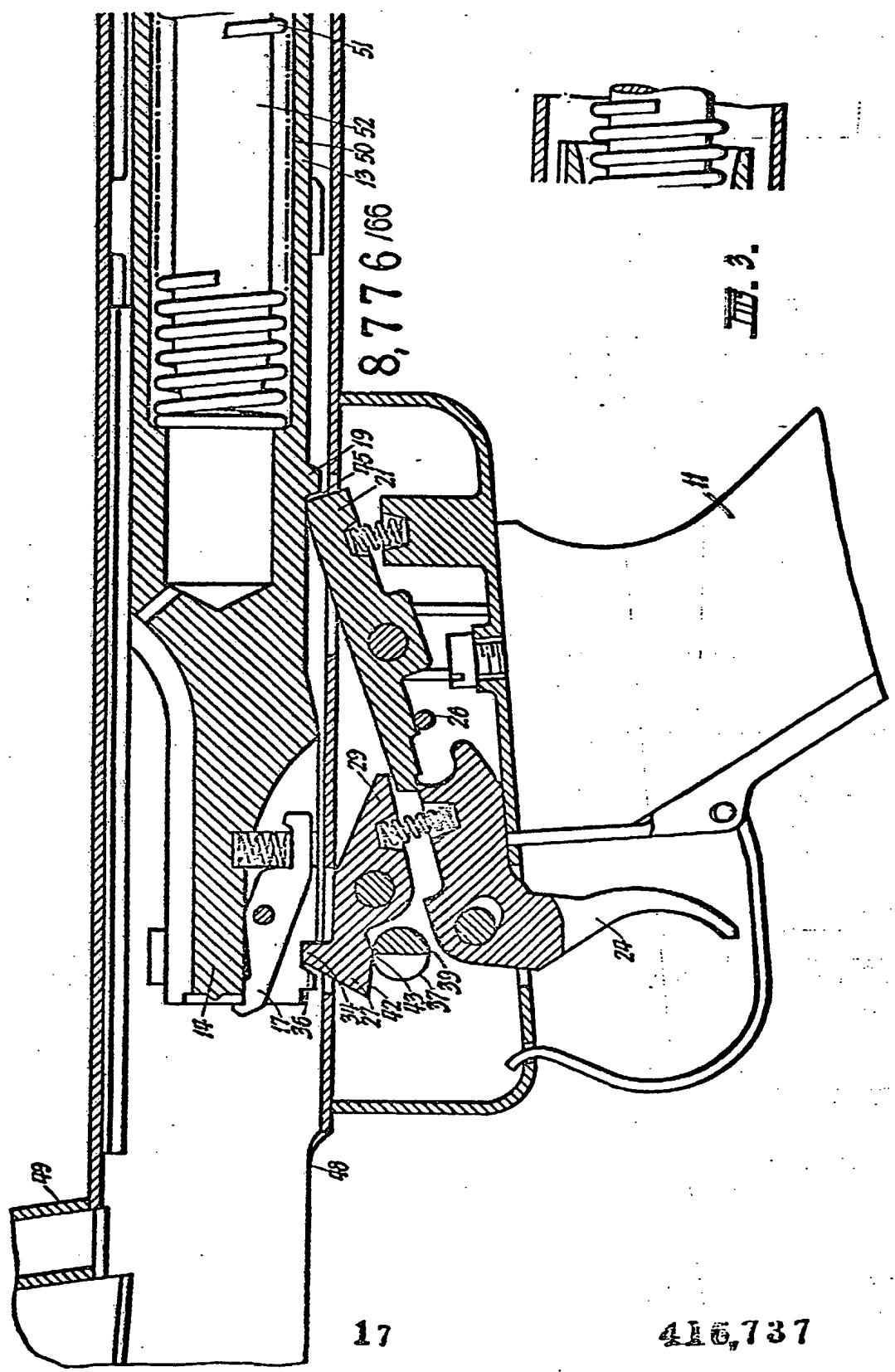
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8,776/66

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III. 3.

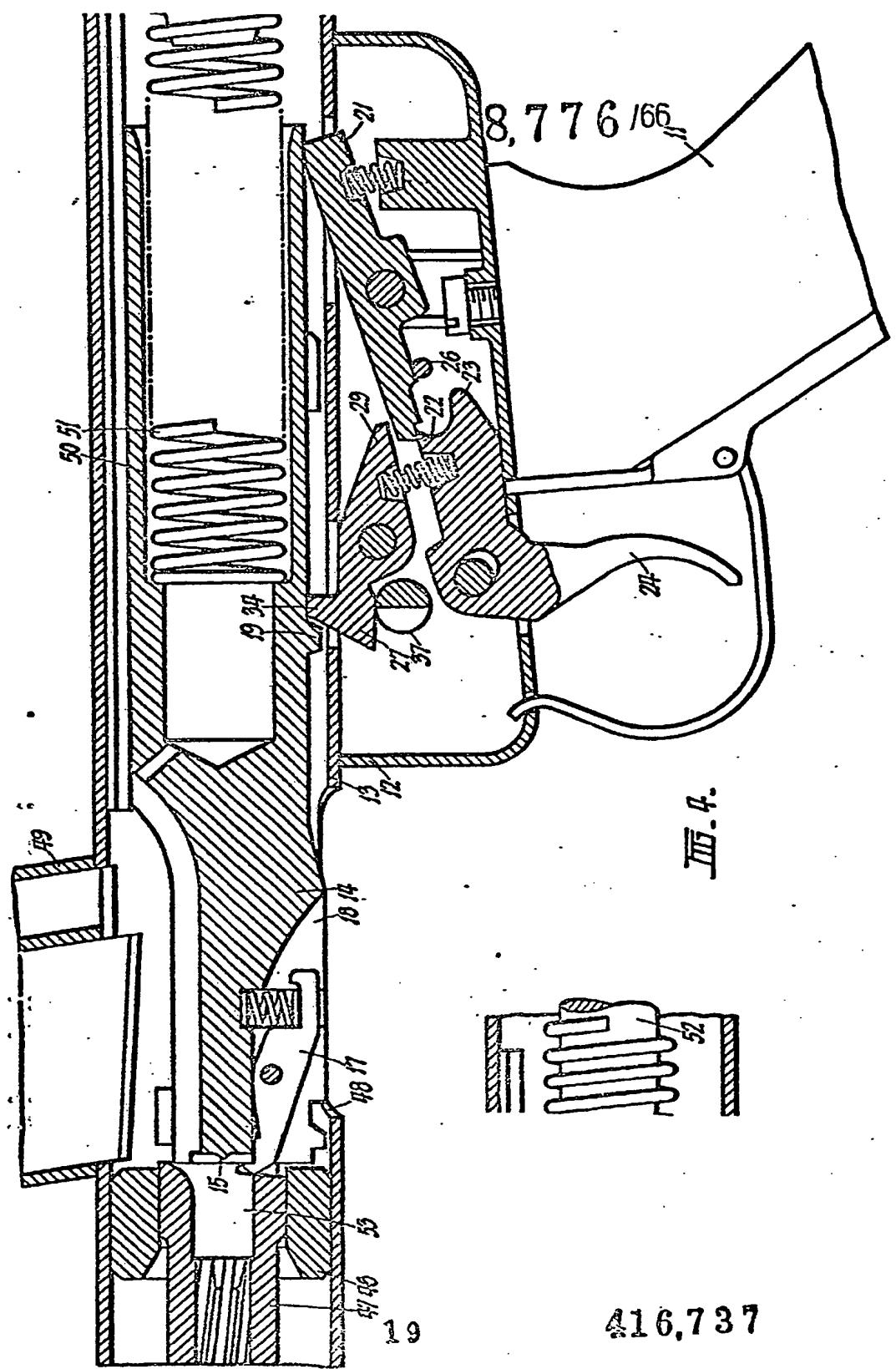
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416737

18



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416,737

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